Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application.

1. (currently amended) A composition comprising:
   (a) a virus-like particle;
   (b) at least one immunostimulatory substance; and
   (c) at least one antigen or antigenic determinant;
   wherein said at least one antigen or antigenic determinant is bound to said virus-like particle, and wherein said immunostimulatory substance is packaged into ~~bound to~~ said virus-like particle, and wherein said immunostimulatory substance is an immunostimulatory nucleic acid, and wherein said antigen comprises~~, alternatively consists essentially of, or alternatively consists of~~ at least one HIV polypeptide.

2. (currently amended) The composition of claim 1, wherein said ~~at least one~~ antigen or antigenic determinant is bound to said virus-like particle by at least one nonpeptide covalent bond~~, and wherein preferably said covalent bond is a non-peptide bond~~.

3. (cancelled)

4. (currently amended) The composition of ~~any of the preceding~~ claims 1, wherein said at least one HIV polypeptide is selected from:
   (a) HIV protein subunit p17-GAG;
   (b) HIV protein subunit p24-GAG;
   (c) HIV protein subunit p15-GAG;
   (d) HIV protein subunit Protease;
   (e) HIV protein subunit reverse transcriptase (RT);
   (f) HIV protein subunit Integrase;

(g) HIV protein subunit Vif;
(h) HIV protein subunit Vpr;
(i) HIV protein subunit Vpu;
(j) HIV protein subunit Tat;
(k) HIV protein subunit Rev
(l) HIV protein subunit gp-41-Env;
(m) HIV protein subunit gp-120-Env;
(n) HIV protein subunit Nef;
(o) Nef-protein consensus sequence (SEQ ID NO: 75);
(p) GAG consensus sequence (SEQ ID NO: 76); and
(q) any fragment of any of the HIV protein subunits or consensus sequences from (a) to (p).

5. (cancelled)

6. (currently amended) The composition of ~~any of the preceding~~ claims 1, wherein said at least one HIV polypeptide has the amino acid sequence of Nef-protein consensus sequence (SEQ ID NO: 75), GAG consensus sequence (SEQ ID NO: 76), or a fragment thereof.

7. (currently amended) The composition of ~~any of the preceding~~ claims 1, wherein said at least one HIV polypeptide comprises~~, alternatively consists essentially of, or alternatively consists of~~ an amino acid sequence selected from:
(a) the amino acid sequence of SEQ ID NO: 77;
(b) the amino acid sequence of SEQ ID NO: 78;
(c) the amino acid sequence of SEQ ID NO: 80;
(d) the amino acid sequence of SEQ ID NO: 81;
(e) the amino acid sequence of SEQ ID NO: 82;
(f) the amino acid sequence (SEQ ID NO: 100);

(g) the amino acid sequence (SEQ ID NO: 102),

(h) the amino acid sequence (SEQ ID NO: 114);

(i) the amino acid sequence (SEQ ID NO: 116); and

(j) any fragment of any of the sequences from (a) to (i).

8. (currently amended) The composition of ~~any of the preceding~~ claims 1, wherein said antigen is a combination of at least two HIV polypeptides, wherein said at least two HIV polypeptides are bound directly or by way of a linking sequence.

9. (currently amended) The composition of claim 8, wherein each of said at least two HIV polypeptides are selected from

(a) HIV protein subunit p24-GAG;

(b) HIV protein subunit Nef;

(c) Nef-protein consensus sequence (SEQ ID NO: 75);

(d) GAG consensus sequence (SEQ ID NO: 76);

(e) any fragment of any of the HIV protein subunits or consensus sequences from (a) to (d).

10. (original) The composition of claim 8, wherein said at least two HIV polypeptides are a combination of at least one HIV polypeptide selected from Nef-protein consensus sequence (SEQ ID NO: 75) or a fragment thereof, and of at least one HIV polypeptide selected from GAG-protein consensus sequence (SEQ ID NO: 76) or a fragment thereof.

11. (currently amended) The composition of claim 8, wherein said at least two HIV polypeptides comprise~~, alternatively consist essentially of, or alternatively consist of~~ an amino acid sequence selected from:

(a) the amino acid sequence of SEQ ID NO: 83;

(b) the amino acid sequence of SEQ ID NO: 84;

(c) the amino acid sequence of SEQ ID NO: 86;

(d) any fragment of any of the sequences from (a) to (c).

12. (currently amended) The composition of ~~any of the preceding~~ claims 1 or 8, wherein said virus-like particle comprises at least one first attachment site and wherein said antigen or antigenic determinant further comprises at least one second attachment site being selected from the group consisting of:

(a) an attachment site not naturally occurring with said antigen or antigenic determinant; and

(b) an attachment site naturally occurring with said antigen or antigenic determinant;

and wherein said binding of said antigen or antigenic determinant to said virus-like particle is effected through association between said first attachment site and said second attachment site, wherein ~~preferably said association is through at least one non-peptide bond~~ said antigen or antigenic determinant and said virus-like particle interact through said association to form an ordered and repetitive antigen array.

13. (cancelled)

14. (currently amended) The composition of claim 12 ~~or 13~~, wherein said first attachment site comprises~~, or preferably consists of,~~ an amino group ~~or a lysine residue~~.

15. (currently amended) The composition of ~~any of the~~ claims 12 ~~to 14~~, wherein said second attachment site comprises~~, or preferably consists of,~~ a sulfhydryl group ~~or a cysteine residue~~.

16. (cancelled).

17. (currently amended) The composition of ~~any of the~~ claims 12 ~~to 16~~, wherein said first attachment site is an amino group and said second attachment site is a sulfhydryl group.

18. (currently amended) The composition of ~~any of the~~ claims 12 ~~to 17~~, wherein ~~said~~ said at least two HIV polypeptides with said second attachment site comprise~~, alternatively consist essentially of, or alternatively consist of~~ an amino acid sequence selected from:
    (a) the amino acid sequence of SEQ ID NO: 72;
    (b) the amino acid sequence of SEQ ID NO: 85;
    (c) the amino acid sequence of SEQ ID NO: 87; and
    (d) any fragment of any of the sequences from (a) to (c).

19. (currently amended) The composition of claim ~~any one of claim~~ 1 ~~to 3~~, wherein said antigen or antigenic determinant ~~comprise, alternatively consist essentially of, or alternatively consist of~~ comprises an amino acid sequence selected from:
    (a) the amino acid sequence of SEQ ID NO: 71; and
    (b) the amino acid sequence of SEQ ID NO: 73.

20. (cancelled)

21. (currently amended) The composition of ~~any one of the preceding~~ claims 1, wherein said virus-like particle is a recombinant virus-like particle, wherein ~~preferably~~ said virus like particle ~~is~~ comprises recombinant proteins selected from the group consisting of:
    (a) recombinant proteins of Hepatitis B virus;
    (b) recombinant proteins of measles virus;
    (c) recombinant proteins of Sindbis virus;
    (d) recombinant proteins of Rotavirus;

(e) recombinant proteins of Foot-and-Mouth-Disease virus;

(f) recombinant proteins of Retrovirus;

(g) recombinant proteins of Norwalk virus;

(h) recombinant proteins of human Papilloma virus;

(i) recombinant proteins of BK virus;

(j) recombinant proteins of bacteriophages;

(k) recombinant proteins of RNA-phages;

(l) recombinant proteins of Ty; and

(m) fragments of any of the recombinant proteins from (a) to (l).

22. (cancelled)

23. (cancelled)

24. (currently amended) The composition of ~~any of the preceding~~ claims 1, wherein said virus-like particle comprises~~, or alternatively consists essentially of, or alternatively consists of~~ recombinant proteins, or fragments thereof, of a RNA-phage, wherein ~~preferably~~ said RNA-phage is selected from the group consisting of:

(a) bacteriophage Qβ;

(b) bacteriophage R17;

(c) bacteriophage fr;

(d) bacteriophage GA;

(e) bacteriophage SP;

(f) bacteriophage MS2;

(g) bacteriophage M11;

(h) bacteriophage MX1;

(i) bacteriophage NL95;

(j) bacteriophage f2;

(k) bacteriophage PP7; and

(l) bacteriophage AP205.

25. (currently amended) The composition of ~~any one of the preceding~~ claims 1, wherein said virus-like particle comprises~~, or alternatively consists essentially of, or alternatively consists of~~ recombinant proteins, or fragments thereof, of bacteriophage Qβ or bacteriophage AP205.

26. (cancelled)

27. (currently amended) The composition of claim ~~26~~ 1, wherein said immunostimulatory nucleic acid is selected from the group consisting of~~, or alternatively consists essentially of~~:
    (a) ribonucleic acids;
    (b) deoxyribonucleic acids;
    (c) chimeric nucleic acids; and
    (d) any mixtures of at least one nucleic acid of (a), (b) and/or (c).

28. (cancelled)

29. (cancelled)

30. (currently amended) The composition of ~~any one of~~ claim 1 ~~to 27 and claims 29~~, wherein said immunostimulatory substance is an unmethylated CpG-containing oligonucleotide.

31. (cancelled)

32. (cancelled)

33. (currently amended) The composition of ~~any one of the preceding~~ claims 30, wherein ~~said at least one immunostimulatory substance, and preferably~~ said unmethylated CpG-containing oligonucleotide[[,]] comprises~~, or alternatively consists essentially of, or alternatively consists of~~ a palindromic sequence.

34. (cancelled)

35. (currently amended) The composition of claim 30, wherein said unmethylated CpG-containing oligonucleotide ~~comprises, or alternatively consists essentially of, or alternatively~~ consists of the sequence GGGGGGGGGGGACGATCGTCGGGGGGGGGG (SEQ ID NO: 41).

36. (cancelled)

37. (cancelled)

38. (cancelled)

39. (cancelled)

40. (cancelled)

41. (cancelled)

42. (currently amended) The composition of claim 30, wherein said palindromic sequence comprises~~, or alternatively consists essentially of, or alternatively consists of~~ GACGATCGTC (SEQ ID NO: 1).

43. (cancelled)

44. (cancelled)

45. (cancelled)

46. (cancelled)

47. (cancelled)

48. (currently amended) The composition of ~~any one of the preceding~~ claims 1, wherein said antigen comprises a cytotoxic T cell epitope, a Th cell epitope or a combination of at least two of said epitopes, wherein said at least two epitopes are bound directly or by way of a linking sequence, and wherein ~~preferably~~ said cytotoxic T cell epitope is a viral or a tumor cytotoxic T cell epitope.

49. (currently amended) A method for enhancing an immune response against an antigen in an animal comprising introducing ~~into said animal a~~ the composition of claim 1 into said animal, wherein an enhanced immune response against said antigen is produced in said animal. ~~comprising:~~

~~(a) a virus-like particle;~~

~~(b) at least one immunostimulatory substance; and~~

~~(c) at least one antigen or antigenic determinant;~~

~~wherein said at least one antigen or antigenic determinant is bound to said virus-like particle, and wherein said immunostimulatory substance is bound to said virus-like particle, and wherein said antigen comprises, alternatively consists essentially of, or alternatively consists of at least one HIV polypeptide.~~

50. (cancelled)

51. (cancelled)

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90. (cancelled)

91. (cancelled)

92. (cancelled)

93. (cancelled)

94. (currently amended) The method of ~~any one of~~ claims 49 ~~to 92~~, wherein said immune response is an enhanced B cell response or an enhanced T cell response~~, wherein preferably said T cell response is a CTL response or a Th cell response, and wherein even more preferably said Th cell response is a Th1 cell response~~.

95. (currently amended) The method of ~~any one of~~ claims ~~49 to 94~~, wherein said animal is a mammal~~, and wherein preferably said mammal is a human~~.

96. (currently amended) The method of ~~any one of~~ claims 49 ~~to 95~~, wherein said composition is introduced into said animal subcutaneously, intramuscularly, intravenously, intranasally or directly into the lymph node.

97. (currently amended) A vaccine comprising an immunologically effective amount of the composition of ~~any one of~~ claim 1 ~~to 48~~ together with a pharmaceutically acceptable diluent, carrier or excipient~~, and wherein preferably said vaccine further comprises an adjuvant~~.

98. (original) A method of immunizing or treating an animal comprising administering to said animal an immunologically effective amount of the vaccine of claim 97.

99. (currently amended) The method of claim 98, wherein said animal is a mammal~~, and wherein preferably said mammal is a human~~.

100. (cancelled)

101. (cancelled)

102. (currently amended) A method of immunizing or treating an animal comprising the steps of priming a T cell response in said animal, and boosting a T cell response in said animal, wherein said priming or said boosting is effected by administering an immunologically effective amount of the vaccine of claim 97.

103. (currently amended) The method of claim 102, wherein said ~~primimg~~ priming and said boosting is effected by administering an immunologically effective amount of ~~a~~ said vaccine of claim 97 ~~or an immunologically effective amount of a heterologous vaccine, and wherein even more preferably said heterologous vaccine is a DNA vaccine~~.

104. (currently amended) An isolated polypeptide comprises~~, alternatively consists essentially of, or alternatively consists of~~ an amino acid sequence selected from:

(a) the amino acid sequence of SEQ ID NO: 77;

(b) the amino acid sequence of SEQ ID NO: 78;

(c) the amino acid sequence of SEQ ID NO: 80;

(d) the amino acid sequence of SEQ ID NO: 81;

(e) the amino acid sequence of SEQ ID NO: 82; ~~and~~

(f) the amino acid sequence of SEQ ID NO: 83;

(g) the amino acid sequence of SEQ ID NO: 84;

(h) the amino acid sequence of SEQ ID NO: 86;

(i) the amino acid sequence of SEQ ID NO: 72;

(j) the amino acid sequence of SEQ ID NO: 85;

(k) the amino acid sequence of SEQ ID NO: 87;

(l) the amino acid sequence of SEQ ID NO: 71;

(m) the amino acid sequence of SEQ ID NO: 73; and

(n) an amino acid sequence having at least 90% sequence identity to any of the amino acid sequences of (a) – ~~(e)~~ (m) and being capable of being presented in a MHC complex.

105. (cancelled)

106. (cancelled)

107. (cancelled)

108. (new) The method of claim 94, wherein said T cell response is a CTL response or a Th cell response.

109. (new) The method of claim 108, wherein said Th cell response is a Th1 cell response.

110. (new) The method of claim 95, wherein said mammal is a human.

111. (new) The vaccine of claim 97, wherein said vaccine further comprises an adjuvant.

112. (new) The method of claim 99, wherein said mammal is a human.